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PRODUCTION

FOR MANAGERS OF MANUFACTURING TECHNOLOGY

Planning Manufacturing Change Today, Tomorrow,

and Beyond

For the Large Plant. . . For the Smaller Company

Capital Spending Plans

PRODUCTION

MARCH 1987

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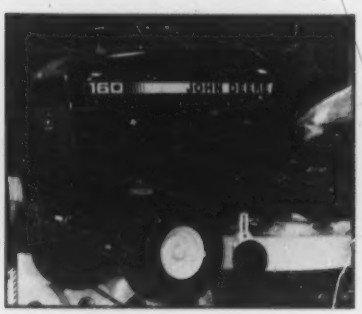

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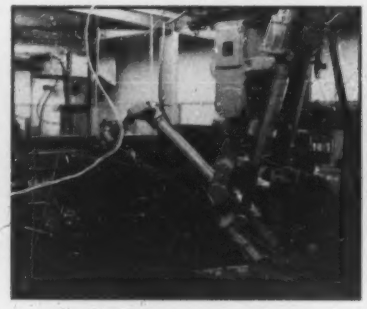

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Capital Spending: Outlook & Trends for 1987 and Beyond

Compare your capital spending outlays, cost targets, reasons for spending with others in your industry. This outlook should help you take measure of your manufacturing position.

By Edward D. McCallum, Jr.
Market Research Consultant

ALL IN ALL...YOU REQUESTED $10.5 billion for 1987 machinery/equipment needs. However, you expect approvals for only $8.15 billion. This is the figure used for all projections of your spending intentions.

This information was gathered in the fall of 1986, when you responded to PRODUCTION's 19th annual survey of capital spending intentions for machinery/equipment which you planned to use in the discrete parts manufacturing and assembly industries (SICs 34-38).

Spending Attitudes at Time of Survey

Only 35.4% of you plan to increase your spending over 1986– down 5% from the previous year. 21.2% plan to spend less, compared to 17.4% in 1986. 40.6% plan no change. In terms of orders, 33% reported an increase, as 8.7% saw a decrease. About one-third were upbeat about 1987; 7.2% had a pessimistic outlook. In each of these cases, the 1987 position is weaker than that of 1986. Put it all together and we come up with a flat forecast of your spending intentions for 1987...about the same as 1986.

In the broadest sense, you are typical if your plant is planning to allo-

TABLE I

Spending Profile Based on Plant Size

No. Of Employees	Machinery/ Equipment Expenditures
less than 50	$160,000
50-99	$518,000
100-499	$630,000
500-999	$937,000
1,000 or more	$2,100,000

cate your capital budget as depicted in Figure 1. You are also typical if, in 1987, your plant size and expenditures compare to those in Table I.

Additional points of comparison for 1987 are:

• You expected to obtain approval for 77.9% of your submitted machinery/equipment budget and to have an approved budget in hand by December, 1986.

• You were operating at 75% of capacity in August-September of 1986, down slightly from the period in 1985. Interestingly, 53.1% plan to operate at a higher level of capacity in 1987 with only 6.9% at a lower level.

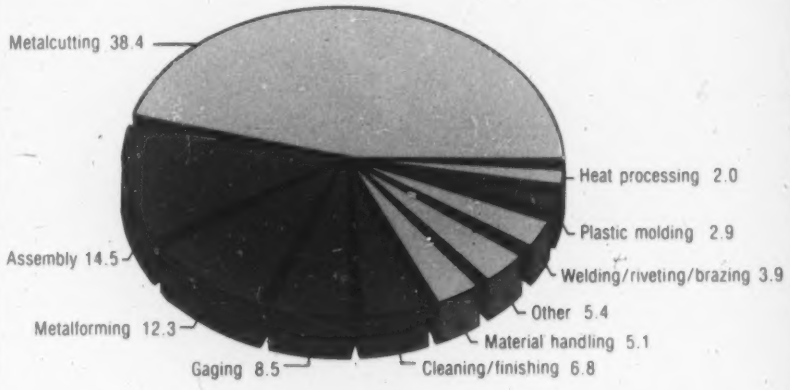
• Your company continues to require a 32% first-year return-on-investment (pre-tax) in justifying new equipment—unchanged over the past few years and still a substantial hurdle to jump when justifying certain types of capital equipment.

• **Electrical discharge machines.** 10.7% are planning EDM purchases over the next three years, down slightly from last year. Approximately 50% of these planned purchases will be made by first-time users. Wire EDM machines will continue to account for the majority of sales over ram-type as reported in recent surveys. Slightly more than one-fifth of the total respondents report they currently use EDM machines.

• **Manufacturing cells.** 15.6% of the total respondents plan to purchase manufacturing cells over the next three years. It is important to be aware

FIGURE 1

How the Capital Equipment Dollar will be Spent (%)



Note: Color indicates increased investment in the category over last year. To compare changes between 1987 and last year's survey, see Table II.

TABLE II

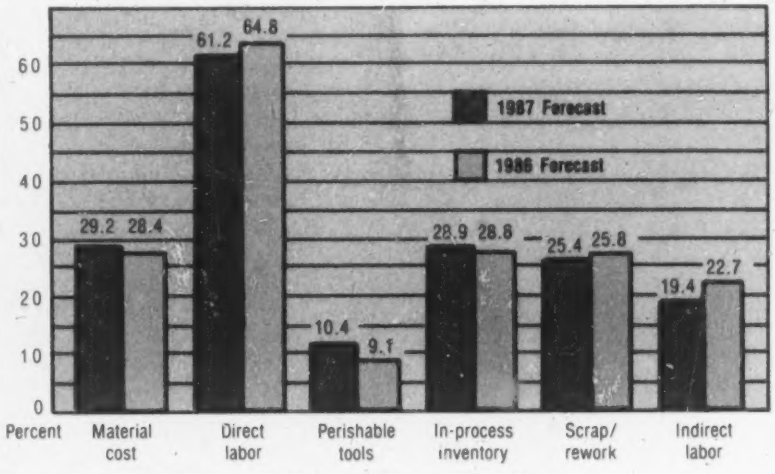
Comparison of Spending Intentions, 1986 and 1987

Machine/Equipment Type	Percent Total Investment 1987	1986	Total Projection (Million $) 1987	1986	Percent Change 1987/1986
Metalcutting	38.4	38.5	3,128	3,245	-3.6
Domestic sourced	48.8	59.5	1,528	1,931	-20.9
Offshore sourced	51.2	40.5	1,600	1,314	+21.8
Assembly	14.5	11.4	1,181	961	+22.9
Metalforming	12.3	11.2	1,003	944	+6.3
Domestic sourced	57.5	68.0	577	642	-10.1
Offshore sourced	42.5	32.0	426	302	+41.1
Gaging/inspection/ testing	8.5	7.2	692	606	+14.2
Cleaning/finishing	6.8	6.5	554	547	+1.3
Other	5.4	11.4	440	961	-45.7
Material handling	5.1	5.2	415	438	-5.3
Welding/riveting/ brazing	3.9	4.0	318	337	-5.6
Plastic molding	2.9	2.6	236	219	+7.8
Heat processing	2.0	2.0	163	168	-3.0

Source: PRODUCTION's Capital Spending Forecasts 1987/1986

FIGURE 2:

Primary Cost Targets for Capital Investment (%)



Source: PRODUCTION's Capital Spending Forecasts 1986/1987

TABLE III

Motives for Planned Machinery/ Equipment Investments (10-year Comparison)*

Motive	5-Year Average 1977-1982**	5-Year Average 1982-1986**	% Change 1982-1986 1977-1981
Cost reduction	47.3	46.8	- 1.1
Increase capacity	38.3	22.5	- 41.3
Improve quality	13.1	19.0	+ 45.0
New model/product	17.1	15.1	- 11.7
Make instead buy	8.7	6.7	- 22.9
Reduce energy	4.4	2.9	- 34.1

**Motives for Capital Equipment Investments*

***Cost reduction:** Still number one on the hit parade as it has been for almost 20 years.*

***Increase capacity:** The fall-off over the last few years reflects the outsourcing trend among many large plants. Those citing a capacity squeeze are located primarily in contractor plants employing 50-500 persons.*

***Improve quality:** Continues to gain in importance, and is becoming a strong reason to purchase new equipment.*

***New models/products:** New capabilities bring some buyers to the market.*

***Make instead buy:** Drop reflects large plant outsourcing.*

***Reduce energy:** Steady decline as result of cheap energy prices; volatile; could change quickly.*

***Percent respondents ranking first. Note: Some respondents ranked more than one motive first.*

Source: PRODUCTION's Capital Spending Forecasts 1977/1986.

TABLE IV

Robots: Current and Future Use

Application	Current Use (% of Respondents)	Plan to Use (% of Respondents)
Arc welding	11.7	14.7
Spot welding	5.6	5.8
Assembly	20.9	28.0
Loan/unload	27.4	34.8
Material handling	15.5	25.4
Spray paint	8.5	10.5
Other	2.8	3.2

Base: Respondents planning robot purchases during 1987-89.

that cells can be machining-oriented, forming-oriented, assembly-oriented, etc. Of those planning purchase of manufacturing cells, almost half (45.0%) already operate cells.

• **Flexible manufacturing systems.** 12.6% of the total respondents plan to purchase flexible manufacturing systems (FMSs) between 1987 and 1989. Of these, 38.0% report they currently operate FMSs, 67.1% report they plan to also operate manufacturing cells over the next three years, and 41.7% report they operate manufacturing cells now.

A *manufacturing cell* was defined in the survey as comprising one material handling device servicing multiple machines which are coordinated and paced by a computer or programmable controller.

A *flexible manufacturing system (FMS)* was defined as comprising multiple material handling devices servicing multiple machines with a computer responsible for coordinating, pacing and scheduling.

Robotics

29.4% of the responding plants will buy robots in the next three years. This is down from 34.5% last year. Slightly over two-thirds of those planning robotic purchases are located in plants with 100 to 1,000 employees. (See Table IV.)

Robot purchase activity is centered in the major industry groups (SICs)

TABLE V

Major Purchase Activity for Robots

SIC	Industry	Percent of Respondents Planning Robot Purchases
34	Fabricated metal products (Primarily SICs 342, 346, 349)	20.7
35	Machinery, except electrical (Primarily SICs 354, 356, 3573, 358)	33.2
36	Electrical Machinery (Primarily, SICs 361, 362, 364, 367)	23.5
37	Transportation Equipment (Primarily SICs 3714, 3724)	15.1
38	Instruments (Primarily SICs 382, 384)	7.6

TABLE VI

Major Purchase Activity for Lasers

SIC	Industry	Percent of Respondents Planning Laser Purchases
34	Fabricated metal products (Primarily SICs 342, 346)	11.7
35	Machinery, except electrical (Primarily SICs 3511, 3541, 3544, 3545, 3561, 356, 3573, 3599)	39.7
36	Electrical machinery (Primarily SICs 361, 366, 367)	14.9
37	Transportation equipment (Primarily SICs 3714, 3724, 3728, 376)	15.9
38	Instruments (Primarily SICs 3811, 382, 383, 384)	17.8

TABLE VII

Offshore Purchasing

SIC	Industry	Percent of Total Respondents Planning Offshore Purchases	Percent of Appropriation going Offshore
3429	Cutlery, hand tools, hardware	54.8	47.1
3451	Screw machine products	65.2	52.0
3469	Metal stampings, NEC	55.2	38.1
3494	Valves and pipe fittings	67.9	41.3
3499	Fabricated metal products, NEC	69.5	38.1
3541	Metalcutting machine tools	62.5	38.8
3542	Metalforming machine tools	46.2	41.6
3544	Dies, tools, jigs, molds	61.9	56.4
3545	Machine tool accessories	47.8	54.5
3551	Food products machinery	64.3	38.3
3559	Special industry machinery, NEC	50.0	44.0
3561	Pumps and pumping equipment	64.0	42.8
3562	Ball and roller bearings	50.0	40.1
3566	Speed changers, drivers, gears	62.5	54.5
3569	General industrial machinery, NEC	58.6	43.2
3599	Machinery, except electrical, NEC	66.3	60.4
3612	Power, distribution and specialty transformers	64.7	36.4
3621	Electric motors	47.6	39.7
3662	Radio and TV transmitting, signaling, and detection equipment and apparatus	61.1	40.7
3679	Electronic components, NEC	54.3	29.8
371	Motor vehicles, motor vehicles parts	60.0	38.2
3724	Aircraft engines	82.4	53.6
3728	Aircraft parts	67.8	42.1
382	Measuring and controlling instruments	53.1	36.9
384	Medical, dental and surgical instruments	64.9	31.9

noted in Table V. Individual industries showing major activity are indicated.

Lasers

12.5% of the total respondents plan to purchase lasers during the next three years. The lasers will be going into larger plants—84.2% of planned buyers are in plants with 100 or more employees; 34.2% are in plants with 500 or more—thus continuing a trend. Type of laser was indicated by 61.2% of the respondents. The selections: 49.6% for CO_2; 39.7% for YAG; 32.1% for helium-neon. Planned applications are gaging/measurement, 46.3%; cutting, 35.5%; welding, 25.2%; drilling, 11.2%; heat treating, 7.9%. Major purchasing activity is centered in the industries noted in Table VI.

Offshore Sourcing

49.9% of the total respondents plan to purchase 42% of their 1987 capital equipment from offshore sources. Although this means fewer are going abroad as compared to last year, they are spending a larger percentage of their budgets with foreign suppliers than last year's respondents indicated. 52.9% plan to buy metalcutting machines; 15.0% metalforming machines; 16.3% gaging/inspection/testing equipment; 31.1% other types of equipment, including assembly, joining, plastic molding, and heat processing. Quality is the number one reason for offshore sourcing. It was picked by 71.2% of the respondents, followed by price, 68.4%; availability, 40.2%, and service, 24.3%.

Industries with a high proportion of respondents planning major offshore purchases are shown in Table VII.

Spending Patterns

For each of the nine production equipment categories listed, the industries cited are those that account for at least 75% of the planned 1987 investments for that particular type of equipment. Industries not listed do not make significant investments in equipment of that type. Comparing your company's investment plans with your industry is simple. Determine the amounts, by percentage, of total capital expenditures budgeted for each of the equipment categories. Then compare those amounts with the listings.

Assembly Machines/Equipment

The average respondent will allocate 14.5% of total investment to assembly machines/equipment.

SIC	Industry	Percent of Total Capital Expenditures
342	Cutlery, hand tools, hardware	16.0
348	Ordnance and access, except vehicles and guided missiles	16.7
357	Office, computing and accounting machines	40.8
361	Electrical transmission and distribution equipment	24.9
362	Electrical industrial apparatus	27.4
363	Household appliances	25.0
364	Electric lighting and wiring devices	26.6
365	Radio and TV receiving equipment, except communication types	38.8
366	Communications equipment	31.7
367	Electronic components and access	33.8
369	Miscellaneous electrical machinery, equipment and supplies	41.9
371	Motor vehicles, motor vehicle equipment	14.1
375	Motorcycles, bicycles and parts	35.0
379	Miscellaneous transportation equipment	20.0
381	Engineering, laboratory, scientific and research instruments and equipment	26.0
382	Measuring and controlling instruments	24.9
384	Surgical, medical and dental instruments and supplies	28.1
387	Watches, clocks, clockwork operated devices, and parts	60.0

Cleaning and Finishing Equipment

The average respondent will allocate 6.8% of total investment to cleaning and finishing equipment.

SIC	Industry	Percent of Total Capital Expenditures
341	Metal cans and shipping containers	9.8
342	Cutlery, hand tools, hardware	9.8
343	Heating equipment, except electric and warm air; and plumbing fixtures	18.9
344	Fabricated structural metal products	11.1
347	Coating, engraving and allied services	50.4
348	Ordnance and access, except vehicles and guided missiles	7.6
349	Miscellaneous fabricated metal products	8.4
352	Farm and garden machinery and equipment	11.0
353	Construction, mining and materials handling machinery and equipment	8.8
358	Refrigeration and service industry machinery	7.4
361	Electrical transmission and distribution equipment	8.0
363	Household appliances	16.3
364	Electric lighting and wiring equipment	11.5
365	Radio and TV receiving equipment, except communications types	14.9
367	Electronic components and accessories	7.7
371	Motor vehicles and motor vehicle equipment	7.1
373	Ship and boat building and repairing	12.3
374	Railroad equipment	12.1
375	Motorcycle, bicycles and parts	10.0
381	Engineering, laboratory, scientific and research instruments and equipment	7.6
383	Optical instruments and lenses	10.5
387	Watches, clocks, clockwork-operated devices, and parts	12.5

Plastic Molding Equipment

The average respondent will allocate 2.9% of total investment to plastic molding equipment.

SIC	Industry	Percent of Total Capital Expenditures
341	Metal cans and shipping containers	.5
342	Cutlery, hand tools, hardware	3.2
343	Heating equipment, except warm air; and plumbing fixtures	5.1
346	Metal forgings and stampings	2.7
354	Metalworking machinery and equipment	3.1
355	Special industry machinery	3.6
357	Office, computing and accounting machines	3.8
358	Refrigeration and service industry machinery	2.7
361	Electrical transmission and distribution equipment	3.0
362	Electrical industrial apparatus	7.9
363	Household appliances	11.3
364	Electric lighting and wiring equipment	8.3
365	Radio and TV receiving equipment, except communications types	8.2
367	Electronic components and access	2.8
375	Motorcycles, bicycles and parts	20.0
383	Optical instruments and lenses	15.8
384	Surgical, medical and dental instruments and supplies	8.7
386	Photographic equipment and supplies	6.0
387	Watches, clocks, clockwork-operated devices and parts	7.5

Material Handling Equipment

The average respondent will allocate 5.1% of total investment to material handling equipment.

SIC	Industry	Percent of Total Capital Expenditures
342	Cutlery, hand tools, hardware	8.8
343	Heating equipment, except electric and warm air; and plumbing fixtures	6.3
344	Fabricated structural metal products	7.2
346	Metal forgings and stampings	5.5
347	Coating, engraving and allied services	6.5
348	Ordnance and access, except vehicles and guided missiles	6.2
352	Farm and garden machinery and equipment	16.0
353	Construction, mining and materials handling machinery and equipment	6.0
356	General industrial machinery and equipment	5.6
357	Office, computing and accounting machines	6.2
358	Refrigeration and device industry machinery	5.6
361	Electrical transmission and distribution equipment	5.7
362	Electrical industrial apparatus	6.9
363	Household appliances	6.4
364	Electric lighting and wiring equipment	8.8
366	Communications equipment	6.7
369	Miscellaneous electrical machinery, equipment and supplies	8.7
371	Motor vehicles, motor vehicle equipment	5.3
373	Ship and boat building and repairing	13.4
374	Railroad equipment	6.5

Heat-processing Equipment

The average respondent will allocate 2.0% of total investment to heat-processing equipment.

SIC	Industry	Percent of Total Capital Expenditures
341	Metal cans and shipping containers	23.8
342	Cutlery, hand tools, hardware	4.6
346	Metal forgings and stampings	4.1
348	Ordnance and access, except vehicles and guided missiles	6.9
349	Miscellaneous fabricated metal products	2.1
354	Metalworking machinery and equipment	2.7
358	Refrigeration and service industry machinery	2.1
361	Electrical transmission and distribution equipment	8.6
363	Household appliances	3.0
365	Radio and TV receiving equipment, except communications types	3.0
367	Electronic components and access	2.5
369	Miscellaneous electrical machinery, equipment and supplies	2.2
371	Motor vehicles, motor vehicle equipment	2.6
372	Aircraft and parts	4.6
373	Ship and boat building and repairing	2.6
374	Railroad equipment	9.3
376	Guided missiles and space vehicles and parts	6.1
379	Miscellaneous transportation equipment	7.0
383	Optical instruments and lenses	8.8
384	Surgical, medical and dental instruments and supplies	2.5

Welding/Riveting/Brazing Equipment

The average respondent will allocate 3.9% of total investment to welding/riveting/brazing equipment.

SIC	Industry	Percent of Total Capital Expenditures
341	Metal cans and shipping containers	6.6
344	Fabricated structural metal products	7.6
346	Metal forgings and stampings	5.0
349	Miscellaneous fabricated metal products	7.8
352	Farm and garden machinery and equipment	9.6
353	Construction, mining and materials handling machinery and equipment	6.9
355	Special industry machinery	5.0
357	Office, computing and accounting machines	4.3
358	Refrigeration and service industry machinery	8.1
361	Electrical transmission and distribution equipment	4.4
369	Miscellaneous electrical machinery, equipment and supplies	4.1
371	Motor vehicles, motor vehicle equipment	5.6
372	Aircraft and parts	3.7
373	Ship and boat building and repairing	14.3
374	Railroad equipment	14.9
375	Motorcycles, bicycles and parts	10.0
379	Miscellaneous transportation equipment	14.8
384	Surgical, medical and dental instruments and supplies	5.7

Metalforming Machinery/Equipment

The average respondent will allocate 12.3% of total investment to metalforming machinery and equipment.

SIC	Industry	Percent of Total Capital Expenditures
341	Metal cans and shipping containers	17.2
342	Cutlery, hand tools, hardware	18.5
343	Heating equipment, except electrical and warm air; and plumbing fixtures	28.9
344	Fabricated structural steel products	26.8
346	Metal forgings and stampings	41.6
347	Coating, engraving, and allied services	22.2
349	Miscellaneous fabricated metal products	15.5
353	Construction, mining, and materials handling machinery and equipment	13.4
358	Refrigeration and service industry machinery	32.3
361	Electrical transmission and distribution equipment	14.4
363	Household appliances	20.3
364	Electric lighting and wiring equipment	18.8
371	Motor vehicles and motor vehicle equipment	10.5
374	Railroad equipment	21.4
375	Motorcycles, bicycles and parts	15.0
376	Guided missiles and space vehicles and parts	16.4
379	Miscellaneous transportation equipment	20.6

Metalcutting Machine Tools

The average respondent will allocate 38.4% of total investment to metalcutting machine tools.

SIC	Industry	Percent of Total Capital Expenditures
345	Screw machine parts	63.1
348	Ordnance and access; except vehicles and guided missiles	42.5
349	Miscellaneous fabricated metal products	33.9
351	Engines and turbines	67.3
353	Construction, mining and materials handling machinery and equipment	45.7
354	Metalworking machinery and equipment	60.8
355	Special industry machinery	51.8
356	General industrial machinery and equipment	52.2
359	Miscellaneous machinery, except electrical	68.1
371	Motor vehicles and motor vehicle equipment	41.3
372	Aircraft and parts	66.5
376	Guided missiles and space vehicles and parts	42.3
386	Photographic equipment and supplies	50.9

Gaging/Inspection/Testing Equipment

The average respondent will allocate 8.5% of total investment to gaging/inspection/testing equipment.

SIC	Industry	Percent of Total Capital Expenditures
345	Screw machine products	9.1
346	Metal forgings and stampings	7.1
348	Ordnance and access, except vehicles and guided missiles	9.1
349	Miscellaneous fabricated metal products	9.2
351	Engines and turbines	8.6
354	Metalworking machinery and equipment	9.4
357	Office, computing and accounting machines	9.8
359	Miscellaneous machinery, except electrical	9.8
362	Electrical industrial apparatus	9.5
365	Radio and TV receiving equipment, except communications types	11.2
366	Communication equipment	13.9
367	Electronic components and access	11.9
369	Miscellaneous electrical machinery, equipment and supplies	8.3
371	Motor vehicle, motor vehicle equipment	9.6
372	Aircraft and parts	8.9
381	Engineering, laboratory, scientific and research instruments and equipment	12.2
382	Measuring and controlling instruments	19.2
383	Optical instruments and lenses	16.7
387	Watches, clocks clockwork-operated devices, and parts	16.0

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